

LOWER SNAKE RIVER COMPENSATION PLAN
Oregon Spring Chinook Salmon Harvest Monitoring
2014 Annual Progress Report

Oregon Department of Fish and Wildlife
Grande Ronde Watershed, East Region



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Front cover photo of Sara and Andy Hayes with Sara's Imnaha River catch. Photo courtesy of Sara Hayes, July 2014.

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EXECUTIVE SUMMARY

Objectives

1. Estimate the number of spring/summer Chinook salmon handled or harvested annually, and angler effort, in recreational fisheries in the Imnaha and Grande Ronde basins.

Accomplishments and Findings

The 2014 run year of spring/summer Chinook salmon to Oregon Snake basin tributaries provided recreational (sport) harvest opportunity on Lookingglass Creek, the Grande Ronde, Wallowa and Imnaha Rivers. Daily bag limits for all fisheries were two adipose fin-clipped chinook adults and five adipose fin-clipped jacks per day, with two daily limits in possession. Anglers were required to cease angling if they had retained a daily limit of marked adults.

Lookingglass Creek – The sport fishery on Lookingglass Creek opened 31 May and closed 18 Jun (19 days). The area open to anglers extended from the mouth at the Moses Creek Lane Bridge upstream to the confluence of Jarboe Creek (RM 2). Angling was restricted to the use of artificial flies and lures to minimize impact on bull trout. During 11 days of creel surveys, 262 anglers were contacted that had fished a total of 1,045 hours. Anglers reported an average catch of one adult Chinook for every 13.4 hours of fishing and one jack for every 40.2 hours of fishing. Effort was estimated at 3,416 angler hours for the Lookingglass Creek fishery. Estimates provided from creel surveys indicated that the Lookingglass fishery accessed 36.4% (4 of 11) of allowed natural-origin (N-O) impacts. Total recreational fishery harvest was estimated at 75.8% (197 of 260) of the allowed limit for hatchery-origin (H-O) adults. In addition, 132 H-O jacks were harvested. Total combined harvest of Lookingglass stock from both Lookingglass and Grande Ronde fisheries was 75.8% (198 of 260) of the allowed H-O adult limit.

Grande Ronde River – Two brief pilot fisheries were opened on the Grande Ronde River from 27-30 Jun (4 days) and 5-7 Jul (3 days). The open area for these pilot fisheries was from the State Highway 129 bridge in Washington (RM 26) to 100 yards upstream of the Wildcat/Powwatka Bridge (RM 52) on the Grande Ronde River road in Oregon. To protect wild stocks, the area immediately adjacent to the mouth of the Wenaha River was closed to angling. During seven days of creel surveys, we contacted 98 anglers who had fished 393 hours. Anglers reported an average catch of one adult Chinook caught for every 90.3 hours of fishing and one jack salmon caught for every 74.7 hours of fishing. Effort was estimated at 1,008 angler hours for the Grande Ronde River pilot fisheries. Estimates provided from creel surveys indicated that the fishery accessed 7.1% (1 of 14) of the allowed N-O adult impacts from the Wallowa-Lostine stock. Estimates of allowable N-O impacts were zero for the remaining Grande Ronde and Wallowa tributaries.

After the Lookingglass fishery closed, 63 H-O Lookingglass adults remained available to harvest in the Grande Ronde fishery. During the fishery, we estimated that 0.4% (1 of 260) and 4.0% (9 of 224) of the harvestable adult limits were used from the Lookingglass and the Wallowa-Lostine stocks, respectively. We estimated that no H-O adults from Catherine Creek or the upper Grande Ronde populations were harvested. Total estimated harvest of H-O jacks was four.

Wallowa River – The Wallowa River sport fishery was open from 21 Jun to 27 Jul (37 days) in 2014. The open area extended from Minam State Park (RM 8) upstream to the mouth of the Lostine River (RM 25). During 22 days of creel surveys, we contacted 134 anglers who had fished 377 hours. Anglers reported an average catch of one adult Chinook caught for every 106.4 hours of fishing and one jack salmon caught for every 100.0 hours of fishing. Effort was estimated at 1,611 angler hours. We estimated that the fishery accessed 7.1% (1 of 14) and none of the total allowed N-O adult impacts from the Wallowa-Lostine and Minam populations, respectively. Total combined impacts for the Wallowa-Lostine stock in the Wallowa and Grande Ronde fisheries was 14.3% (2 of 14) of allowed N-O adults. We estimated that 4.5% (10 of 224) of the allowed H-O adult harvestable limit from the Lostine population was used in the fishery, in addition to 12 H-O Jacks. Total combined harvest of the Lostine hatchery stock in the Grande Ronde and Wallowa fisheries was 8.5% (19 of 224) of the total harvestable allowance.

Imnaha River – The Imnaha River fishery opened 5 Jul and closed 27 Jul (23 days). The open area extended from the confluence with the Snake River to Summit Creek Bridge (RM 45). This fishery offered a brief season for adult salmon retention from 5-6 Jul, and from 7-27 Jul the fishery was limited to a daily bag limit of five fin-clipped jacks per day with two daily limits in possession. During 14 days of creel surveys, we contacted 87 anglers who had fished a total of 297 hours. During the adult retention season (5-6 Jul), anglers reported an average catch of one adult Chinook caught for every 17.4 hours of fishing, and one jack salmon caught for every 11.7 hours of fishing. Effort was estimated at 1,133 angler hours for the entire Imnaha River fishery. Estimates provided from creel surveys indicated that the fishery accessed 9.1% (1 of 11) of the allowed N-O adult impacts. Total recreational fishery harvest was estimated at 33% (33 of 100) of allowed H-O adults; in addition to 99 H-O jacks, of which 66 were caught during the jack-only fishery. No adult Chinook were reported caught during the jack-only season.

INTRODUCTION

The Imnaha and Grande Ronde River spring Chinook hatchery programs are components of the Lower Snake River Compensation Plan (LSRCP), funded through the U.S. Fish and Wildlife Service (USFWS), developed to mitigate for wild fish production lost as a result of construction of the four lower Snake River dams. Hatchery Chinook and steelhead smolts in the Snake River basin are produced at LSRCP hatcheries in Washington, Idaho and Oregon. Subsequent adult returns are meant to provide tribal and recreational (sport) fisheries and, in some cases, enhance natural spawner numbers. The Oregon Department of Fish and Wildlife initiated the Imnaha and Grande Ronde spring Chinook hatchery program in 1982 under the LSRCP. Subsequent program management has been coordinated between ODFW, Confederated Tribes of the Umatilla Indian Reservation (CTUIR), and Nez Perce Tribe (NPT).

The Imnaha and Grande Ronde River hatchery programs are comprised of five components, each with smolt acclimation and adult collection facilities located on the Imnaha River, upper Grande Ronde River, Lookingglass and Catherine Creeks, and the Lostine River. The Lostine River program interacts with natural production within the broader Wallowa-Lostine population unit. Other hatchery program components are discrete to specific populations indicated. The Lookingglass Creek portion of the program focuses on reintroduction of spring Chinook to that stream and targets the release of 250,000 smolts originating from the Catherine Creek population. Each of the four remaining program components integrates natural-origin fish returning to each respective tributary into production. Smolt release goals, developed to meet LSRCP mitigation responsibilities, include 490,000 for the Imnaha, 250,000 for the Lostine and upper Grande Ronde rivers, and 150,000 for Catherine Creek.

Fisheries that target returns to the Imnaha and Grande Ronde hatchery programs are guided by Fishery Management and Evaluation Plans (FMEP), approved by NOAA fisheries under limit 4 of the final 4(d) rule of the Endangered Species Act (ODFW 2011, ODFW and WDFW 2012). The objective of the FMEP is to provide recreational fishing opportunities and related benefits derived from harvest of Imnaha and Grande Ronde basin hatchery-origin spring Chinook salmon in Oregon and Washington in a manner that supports the continued survival and future recovery of natural-origin Chinook salmon. Each respective FMEP utilizes a management framework for harvest of adipose-clipped, hatchery-origin Snake River spring/summer Chinook salmon using abundance-based sliding scales to set annual fishery impacts.

Fisheries are prescribed maximum impact rates for both direct and incidental mortality of natural-origin adult salmon in sport and tribal fisheries. Impacts are assessed for each population in relation to critical and minimum abundance thresholds (MAT) as described by the Interior Columbia Technical Recovery Team (ICTRT 2007). Population designations for the Imnaha and Grande Ronde Basins are listed in Table 1, and are based upon an analysis of Chinook salmon life history traits, distribution, abundance, and productivity, and geographical and ecological characteristics of the landscape within the Snake River Spring/Summer Chinook Salmon ESU (McElhany et al. 2000).

The abundance-based harvest rate schedule for Imnaha and Grande Ronde Basin fisheries to be shared by all fishing entities in the basin is described in Table 2. Harvest is not considered when hatchery run size does not exceed the number of adults identified for broodstock and supplementation needs as described by sliding scale management plans set for each population's hatchery program. Surplus is generally defined as the adult hatchery run projection less hatchery adults needed for broodstock. This approach limits sport harvest during years when wild fish runs are below MAT and hatchery fish runs are of similar size. In addition, near the lower end of the harvest rate scale, fisheries are not implemented until the allowable hatchery fish harvest exceeds 20 fish due to potential to over harvest within a single week.

Fishery impacts to listed Snake River spring/summer Chinook salmon are assessed on a collective basis (i.e., the sum of recreational and tribal fisheries) by NOAA fisheries. However, the coordination of impact amongst states and tribes is a key component of executing conservation-based fisheries in the Imnaha and Grande Ronde Basins. Co-managers within each basin have developed, and implement annually, an impact sharing agreement that is described in Table 3. Within each fishery scenario, this agreement provides tribal fisheries more of the natural-origin impacts to reflect the non-selective nature of traditional fishing techniques. Recreational fisheries are provided a larger portion of the hatchery harvest such that all available impacts (hatchery and natural collectively) are shared equally (Table 3).

Recreational fisheries administered by the states limit harvest (retention) of spring/summer Chinook hatchery-origin salmon with a clipped adipose fin (as evidenced by a healed scar). All salmon with an intact adipose fin (natural-origin) must be released back to the water. Therefore, incidental mortality impacts occur from catch and release of unclipped Snake River spring/summer Chinook salmon in fisheries targeting adipose-clipped hatchery Chinook salmon, and/or from the illegal retention of unclipped fish. It is generally assumed throughout the Columbia River Basin that the mortality rate resulting from the catch and release of salmon in fisheries is 10%. However, for Lookingglass Creek co-managers, with concurrence from NOAA fisheries, assume a slightly lower rate of 7.5% (ODFW and WDFW 2012).

As stated in the FMEP, fisheries are adjusted or terminated when the total ESA take limit identified in Table 2 and 3 has been reached. Therefore, once fisheries are initiated regular monitoring is required to ensure consistency with co-manager agreements and FMEP requirements. The objective of this LSRCP project was to conduct statistical creel surveys to determine spring Chinook and steelhead ESA impact levels, harvest and release rates, and to inform decisions regarding fishery status in the Imnaha and Grande Ronde Basins in 2014. In this report, we describe creel surveys conducted and estimates of angler effort, catch, and harvest. In addition we compare these estimates in relation to estimates of natural and hatchery-origin returns to each population to assess consistency with prescribed impacts under FMEP guidelines.

METHODS

Lookingglass Creek – The Lookingglass Creek fishery was surveyed using an access point design with a check station located at point of entry/exit to the fishery (Figure 1). One creel clerk staffed the check station four days per week. The creel survey was stratified by weekends and weekdays, and survey dates were weighted to sample weekends at a higher rate than weekdays (both weekend days and two randomly-selected weekdays per week). An approximate 8-hour shift was applied each day. AM shifts began at 0600 hours before and ended at 1300 hours. PM shifts began at 1300 hours and ended 60 minutes after sunset. Shifts were selected randomly within strata.

All anglers leaving the fishery area during survey shifts were interviewed by the creel clerk. Each interview determined: whether the angler (or anglers) completed fishing for the day, whether they were targeting Chinook salmon, their place of origin, the predominant gear type used, and how many hours the anglers spent actively fishing. Total angler hours for each party were determined by multiplying the number of anglers in the party with the number of hours spent fishing.

Catch information was also determined from interviews and/or visual inspection of harvested fish. Jack and adult salmon were differentiated by length, whereby jacks were considered equal to or less than 61

cm (24 inches) and adults exceeded 61 cm (24 inches). Total catch of adult and jack salmon were determined through angler interviews for each survey day. Adult and jack salmon harvested in the fishery were inspected by the creel clerk, measured for length, and scanned for the presence of a coded wire tag. If a coded wire tag was present, the snout was removed with the angler's consent. At the end of the season, snouts were forwarded to the ODFW laboratory in Clackamas, OR for tag retrieval.

Grande Ronde, Wallowa, and Imnaha rivers – The Grande Ronde Wallowa, and Imnaha fisheries were surveyed using a roving survey design that was stratified into three sections on the Grande Ronde River, and two sections on the Wallowa and Imnaha rivers. The lower section on the Grande Ronde extended from the Hwy. 129 Bridge (RM 26) upstream to the Oregon state border (hereafter, Stateline) at RM 39. The middle section extended from the Stateline upstream to the confluence of the Wenaha River (RM 45) at the town of Troy, OR. The area immediately adjacent to the mouth of the Wenaha River was closed to protect wild stocks. The uppermost section continued upstream from the Wenaha River to 100 yards above the Wildcat/Powwotka Bridge on the Grande Ronde River road at RM 52 (Figure 2).

On the Wallowa River, the lower section extended from the downstream end of Minam State Park (RM 8) to the confluence with the Minam River (RM 10). The upper section extended from the Minam River upstream to the confluence with the Lostine River (RM 25, Figure 3).

For the Imnaha River, the lower survey section extended from the FR 4260 bridge (Cow Creek Bridge) at RM 5 upstream to Horse Creek at RM 13. The upper section extended from Fence Creek (RM 20) upstream to the terminus of the fishery area at Summit Creek (RM 48). A seven-mile section between Horse Creek and Fence Creek was not surveyed (Figure 4). Referred to as the 'Box Canyon' this section is very remote, mostly privately owned, and generally receives a negligible amount of fishing effort. In addition, the section downstream of the Cow Creek Bridge to the Imnaha River's confluence with the Snake River (lower terminus of the fishery area) is accessed only by foot and was not regularly surveyed. We describe methods used to incorporate this reach into the creel estimates below.

For both the Wallowa and Imnaha rivers, each reach was surveyed four days per week during the fishery. Creel surveys were stratified by weekends and weekdays, and survey dates were weighted to sample weekends at a higher rate than weekdays (both weekend days and two randomly-selected weekdays per week). An approximate 10-hour shift was applied each day that included drive time. Shifts were stratified into morning (AM) and evening (PM) shifts to capture variability in angling effort and catch rates. AM shifts began at 0500 or 0600 hours, and PM shifts began at 1300 or 1400 hours. Shifts were selected randomly within strata.

Grande Ronde River surveys were conducted every day during the pilot fisheries to gather information to guide future efforts. Therefore, stratification of weekends and weekdays was not necessary. Besides this exception, all methods were identical to those described for the Wallowa and Imnaha rivers.

Roving surveys consisted of pressure counts and angler interviews. Three pressure counts were conducted every survey day, each beginning at two-hour intervals from the designated start time. Pressure counts consisted of driving along the river and counting anglers that were actively fishing (i.e., not those at their vehicles or walking to and from the river). Tying knots and baiting hooks counted as actively fishing. The starting location (either the upstream or downstream end of the fishery) of each day's first pressure count was selected at random, and subsequent counts alternated the direction of travel. Creel clerks were instructed to spend the same amount of time on each pressure count (i.e. travelling at the same rate of speed and stopping at the same vantage points) to equalize effort among counts.

Angler interviews were conducted between pressure counts, and clerks placed emphasis after counts were completed to record as many completed angler trips each day. Each interview determined: whether the angler (or anglers) completed fishing for the day, whether they were targeting Chinook salmon, the place of origin, the predominant gear type used, and how many hours the anglers spent actively fishing. Total angler hours for each party were determined by multiplying the number of anglers in the party by the number of hours spent fishing.

Catch information was determined by identical methods described above for the Lookingglass fishery.

Lookingglass Fishery Data Analysis – Total effort (\hat{E}), angler hours (e_i), catch (fish landed; \hat{C}), and harvest (fish kept; \hat{H}) were estimated using methods described by Pollock et al. (1994) for access point creel designs. Estimates were conducted within survey weeks and weekday/weekend strata, and summed across weeks during the fishery. Total effort was estimated for each stratum as follows:

$$\hat{E} = \sum_{i=1}^n (e_i / \pi_i)$$

where: \hat{E} = Total effort, e_i = angler hours for the i th sample day, and π_i = probability of encountering an angler on the i th sampling day. Angler-hours (e_i) were estimated for each stratum as:

$$e_i = \sum_{i=1}^n (m_i)(t_i)$$

where: e_i = angler hours for the i th sample day, m_i = number of anglers on the i th sampling day, t_i = time spent fishing on the i th sampling day. Total catch or harvest (\hat{C}) for each stratum was estimated by:

$$\hat{C} = \sum_{i=1}^n (c_i / \pi_i)$$

where: \hat{C} = Total catch; c_i = catch for the i th sample day, π_i = probability of encountering an angler on the i th sampling day. Consistent with guidelines established in the Grande Ronde Basin FMEP, a handling mortality rate of 7.5% was applied to the estimated catch (fish landed and released) of natural and hatchery-origin adults to estimate fishery impacts.

Within strata variance estimates for catch and effort estimates ($v(\hat{\theta}_i)$) were derived using methods described by Pollock et al. (1994):

$$v(\hat{\theta}_i) = \frac{N^2 \sum_{j=1}^n (\theta_j - \bar{\theta})^2}{n(n-1)}$$

Where N is the number of days in the strata, and n is the number of days surveyed. Season variance ($v(\hat{\theta})$) was estimated as the sum of the strata variance estimates. Ninety-five percent confidence intervals were estimated as (Cochran 1977):

$$\hat{\theta} \pm 1.96 \times \sqrt{v(\hat{\theta})}.$$

Estimates of catch and variance were conducted separately for each species, adults and jacks, and fish that were harvested and released.

Grande Ronde, Wallowa, and Imnaha Fishery Data Analysis – Total angler effort (\hat{E}), catch and harvest (fish landed or kept, respectively, \hat{C}) were estimated using methods described by Scheaffer et al. (1979) for stratified cluster sampling. A three-stage method was used to stratify the temporal and spatial sample frame. Days were initially stratified by week of the season, then by day type (i.e., weekday, weekend day) and section.

The lower survey section on the Imnaha River incorporates a five-mile river section accessed only by foot between the FR 4260 Bridge (Cow Creek Bridge) and the Imnaha River mouth. Due to the remote nature, regular pressure counts could not be conducted in this reach. In addition, the upper section of the Wallowa River fishery also includes a 0.4 mile public access area near the confluence with the Lostine River that is difficult to access from the road. Therefore, regular pressure counts are not conducted in either of these reaches. To adjust pressure counts for anglers fishing in these areas, vehicles were counted at the parking areas used to access these stretches of river as a surrogate. Information collected during previous years suggested that each vehicle represented 1.6 anglers in these sections. Therefore, adjusted angler counts in the lower survey section were calculated as:

$$\hat{m}_i = m_i + 1.6v_i$$

where: \hat{m}_i = estimated number of anglers in the lower Imnaha and upper Wallowa survey reaches on the i th day, m_i = number of anglers observed during pressure counts on the i th day, and v_i = number of vehicles observed at the lower Imnaha trailhead on the i th day. For all other sections on the Grande Ronde, Wallowa and Imnaha rivers; m_i was not adjusted. Total angler effort (in hours) was estimated for each stratum as:

$$\hat{E} = \bar{m} \times d \times h$$

where: \bar{m} = the mean angler count during the stratum (as a function of m_i for the unadjusted reaches, and \hat{m}_i for adjusted reaches as described above), d = the number of survey days during the stratum, and h = hours of daylight for each survey day during the strata, assumed to be 16 hours during the fishery. Mean adjusted angler count during the stratum (\bar{m}) was calculated as:

$$\bar{m} = \frac{\sum m_i}{\sum p_i}$$

where: m_i = number of anglers counted during the i th sample day (or \hat{m}_i for adjusted sections, as described above), and p_i = total of all counts made on the i th sample day.

Total catch or harvest (\hat{C}) for each stratum was estimated as:

$$\hat{C} = \hat{E} \times \bar{r}$$

where: \hat{E} = total estimated angler hours during the stratum, and \bar{r} = the mean catch or harvest rate during the stratum. Mean catch or harvest rate (fish/angler hour) for the stratum was estimated as:

$$\bar{r} = \frac{\sum x_i}{\sum w_i}$$

where: x_i = the reported catch and/or harvest for the i th party interviewed, and w_i = total angler hours expended by the i th party when interviewed. Consistent with guidelines established in the Imnaha Basin FMEP, a handling mortality rate of 10.0% was applied to the estimated catch (fish landed and released) of natural and hatchery-origin adults to estimate fishery impacts.

Within-strata variance estimates for catch and effort estimates ($v(\hat{\theta}_i)$), season variance ($v(\hat{\theta})$) and Ninety-five percent confidence intervals were derived using methods described above (see: Lookingglass Fishery Data Analysis).

N-O adult estimates – Run projections based on PIT tag recoveries for N-O adults are not available for the Wallowa River and Grande Ronde tributaries outside the Lostine River, upper Grande Ronde, Catherine Creek, and Lookingglass Creek. Therefore, we utilized relationships between redds counted in the Lostine River, Minam River, upper Wallowa River, Bear Creek, Hurricane Creek, Wenaha River, and Catherine Creek to estimate N-O adult returns for: 1) the upper Wallowa basin excluding the Lostine River, 2) the Minam River and 3) the Wenaha River.

Since the Grande Ronde and Wallowa fisheries are mixed-stock, estimates of N-O adults are required to determine fishery quotas for all stocks that may be intercepted. Estimates for N-O adults from the upper Wallowa Basin were derived based on the average proportion of total redds counted in the Lostine River, upper Wallowa River, Bear Creek and Hurricane Creek, and N-O estimates for the Lostine River. These estimates assume that N-O returns to the Lostine River are proportional to redd counts throughout the basin. Based on redd counts from 2001-2013, the amount of N-O adults returning to the Wallowa River Basin (outside the Lostine) was equivalent to 40% of the estimated Lostine River return. We estimate that N-O adults returning the Minam River were equivalent to 74% of the estimated Lostine River return.

Estimates for Wenaha River N-O adults were derived using a significant linear function ($P < 0.05$) based on: 1) previous estimates of N-O adult returns to Catherine Creek and, 2) previous estimates of N-O adult returns to the Wenaha River, calculated by the number of redds expanded by an expansion rate of 3.2 adult fish per redd. Of the Grande Ronde tributaries, estimates of Catherine Creek N-O adult returns were best correlated with estimates of N-O adult returns to the Wenaha River. Estimates of returning N-O adults for the Wenaha River were calculated as:

$$y = 0.8563x + 331.18$$

where: y = estimated returning N-O Wenaha adults, and x is the N-O adult return estimate for Catherine Creek.

Catch Allocation – The Grande Ronde and Wallowa fisheries have the potential to encounter N-O and H-O adults from other Grande Ronde basin populations. In order to estimate harvest and ESA impacts from in these mixed-stock fisheries, we are required to allocate catch and harvest for each population the fishery may encounter (Table 4).

Unique PIT tag detections for salmon detected at Lower Granite Dam and at subsequent weirs on the Lostine River and Catherine Creek suggested that salmon migrate at a rate of approximately 11 kilometers per day. Considering the fishery area is located approximately 161 km from Lower Granite Dam, we assume fish take approximately two weeks to reach the fishery area once detected. Therefore, we assumed that run timing in the fishery area would be representative of the run timing observed at Lower Granite Dam, with a delay of two weeks.

Based on the estimated run timing in the fishery area, combined with the total estimated returns for each stock (i), we estimated the total number adults from each stock present in the fishery for each week (j) as:

$$\hat{N}_{ij} = x_{ij} \times y_i$$

where: \hat{N}_{ij} = total amount of fish from stock i that we estimated would be present on week j of the fishery, x_{ij} represents the proportion of stock i that we estimated would be present on week j of the fishery based on estimated run timing, and y_i represents the estimated adult return (N-O or H-O) for stock i .

The total estimated number of fish from all stocks present in the fishery (\hat{R}) during week j was calculated as:

$$\hat{R}_j = \sum \hat{N}_{ij}$$

We assumed each stock would be caught at the same rate that they were present in the fishery. Therefore, the proportion of the total estimated catch (\hat{P}) represented by stock i for week j was calculated as:

$$\hat{P}_{ij} = \frac{\hat{N}_{ij}}{\hat{R}_{ij}}$$

Therefore, the total estimated catch allocated (K) for stock i on week j was calculated as:

$$K_{ij} = \hat{P}_{ij} \times C_j$$

where: C_j = total estimated catch for the week i based on creel surveys. Estimated catch for each stock was rounded to the nearest whole number to remain consistent with catch estimates.

There is no available run timing information for the Wenaha River so the Minam River run timing was used as a surrogate. The upper creel section on the Grande Ronde River was above the Wenaha River; Therefore, Wenaha N-O adults were not considered part of the catch proportion for this section.

The Wallowa River fishery was broken up into two creel sections, upstream and downstream of the Minam River confluence (Figure 3). The upper section is assumed to only intercept N-O and H-O adults from the Wallowa-Lostine stock. However, the lower section has potential to intercept N-O adults from the Wallowa-Lostine and Minam stocks. Therefore, estimated encounter probabilities (see above for the Grande Ronde fishery) were used to estimate catch of Wallowa-Lostine and Minam N-O adults in this fishery section.

RESULTS AND DISCUSSION

Lookingglass Creek – In-season return estimates based on PIT tag recoveries at Bonneville Dam indicated a relatively moderate return of adult Chinook to Lookingglass Creek in 2014. State and Tribal co-managers agreed to manage fisheries in Lookingglass Creek on a total estimated return of 375 N-O and 1,173 H-O adults (Table 5).

The 2014 Lookingglass sport fishery was managed within two constraints: 1) the allowable number of N-O adults handled in the fishery, and 2) the allowable number of H-O adults harvested in the fishery. Given run estimates, FMEP guidelines allowed for a sport fishery impact of 11 natural fish (2.9% of the run) and an allowable harvest and/or incidental mortality of 260 adult H-O salmon (22.2% of the run). By applying a handling mortality rate of 7.5%; we determined sport anglers could not handle more than 147 N-O adult salmon before exceeding ESA impact limits.

The sport fishery on Lookingglass Creek opened 31 May and closed on 18 Jun (19 days). The area open to anglers extended from the mouth of Lookingglass Creek at the Moses Creek Lane Bridge upstream to the confluence of Jarboe Creek (RM 2). Daily bag limits for the Lookingglass Creek fishery was limited two adipose fin-clipped chinook adults and five adipose fin-clipped jacks per day. Anglers were required to cease angling if they had retained a daily limit of marked adults. Angling was restricted to the use of artificial flies and lures only to minimize impact on bull trout.

Creel surveys were conducted on 11 days of the fishery. During the surveys, 262 anglers were contacted who had fished a total of 1,045 hours. Anglers reported an average catch of one adult Chinook (N-O and H-O combined) for every 13.4 hours of fishing and one jack for every 40.2 hours of fishing. Total effort was estimated at 3,416 (95% CI = 3,120-3,708) angler hours for the Lookingglass fishery (Table 6). We estimated 53 (95% CI = 27-80) unmarked N-O adults and five (95% CI = 0-15) marked H-O adults were caught and released in the Lookingglass fishery in 2014 (Table 6). Assuming a handling mortality rate of 7.5%, we estimated an incidental mortality of four N-O and zero H-O adult salmon. We estimated that sport anglers harvested 197 (95% CI = 112-273) H-O adults in the 2014 Lookingglass fishery (Table 6). Finally, we estimated that anglers handled 34 (95% CI = 20-48) bull trout during the fishery.

Based on creel surveys, the 2014 Lookingglass fishery was managed within predetermined ESA impact limits and harvest sharing agreements. Estimates provided from the creel survey indicated that 36.4% (4 incidental mortalities of 11 allowed) of the N-O impacts and 75.8% (197 harvested of 260 allowed) of the H-O harvest quota were used in the fishery.

Grande Ronde / Wallowa Rivers – In 2014 we conducted a pilot fishery in the lower Grande Ronde River to augment sport harvest of Lostine stock Chinook salmon, which are also targeted in the Wallowa River fishery. Since the Wallowa fishery first opened in 2008, harvest rates have largely underperformed expectations, accessing only 3-6% of allowable limits. The short-term pilot fishery was implemented to gather information to guide future management decisions for this fishery. Both Grande Ronde and Wallowa fisheries are mixed-stock fisheries that target the same hatchery stock, so we report them together here.

H-O adult estimates were 1,230 for the Lostine River, 412 for Catherine Creek and 349 for the upper Grande Ronde. Based on these data, co-managers agreed to manage the Wallowa and Grande Ronde fisheries on allowable harvest and/or incidental mortality of H-O adults of 224 (18.2% of the run) for the Lostine River, 61 (14.8% of the run) for Catherine Creek and zero for the upper Grande Ronde River. After the preceding Lookingglass fishery closed 18 Jun, the remaining allowable Lookingglass H-O adult harvest available to the Grande Ronde fishery was 62.

Run projections of N-O adults were 242 and 524 for the upper Grande Ronde River and Catherine Creek, respectively. Based on these data, co-managers agreed to manage the Wallowa and Grande Ronde fisheries on N-O estimates of 770, 413, and 780 unmarked adults for the Wallowa-Lostine, Minam and Wenaha rivers, respectively (Table 5). Based on FMEP guidelines, these run estimates allow for a sport fishery impact of zero (0.0% of the run) for the upper Grande Ronde River, seven for Catherine Creek (1.7% of the run), eight for the Wenaha River (1.0% of the run), four for the Minam River (1.0% of the

run), and fourteen for the Wallowa-Lostine population (1.8% of the run). After the preceding Lookingglass fishery closed 18 Jun, the remaining allowable Lookingglass N-O adult impact was seven (1.9% of the run).

There was potential for the Grande Ronde River fishery to intercept upper Grande Ronde River stocks; which offered no or limited allowable N-O or H-O impacts. Run timing analyses from PIT tag recoveries at mainstem dams and in basin weirs, suggest both H-O and N-O adults from these tributaries would have passed the fishery area prior to the opening of the Grande Ronde River fishery. We estimated the proportion of total catch to be zero for these populations except the Lookingglass stock of which one H-O fish was harvested (Table 4).

The 2014 Wallowa and Grande Ronde sport fisheries were managed within two constraints: 1) the allowable number of N-O adults handled collectively in both fisheries for each stock, and 2) the cumulative number of H-O adult harvest and incidental mortality from all fisheries for each stock. Given N-O adult run estimates, FMEP guidance, and an applied handling mortality of 10.0% except for Lookingglass stock where applied handling mortality was 7.5%; the amount of N-O adult salmon handled in the sport fisheries could not collectively exceed 70 for Catherine Creek, 140 for Wallowa-Lostine, 40 for the Minam River, 80 for the Wenaha River and no N-O fish may be handled from the upper Grande Ronde River. After the preceding Lookingglass fishery closed 18 Jun, the remaining allowable Lookingglass N-O adult that could be handled was 93.

The Grande Ronde fishery was open from 27 Jun to 30 Jun (4 days) and 5 Jul to 7 Jul (3 days). The area open to salmon angling extended from the Washington state highway 129 bridge upstream to a deadline located 100 yards upstream of the Wildcat/Powwotka Bridge on Grande Ronde River Road in Oregon. The area immediately adjacent to the mouth of the Wenaha River was closed to protect wild stocks.

Creel surveys were conducted during all seven days of the Grande Ronde pilot fishery. During the survey we contacted 45 anglers that fished 208 hours in Oregon, and 68 anglers that fished 283 hours in Washington. Anglers reported an average catch of one adult Chinook (N-O and H-O combined) for every 31.3 and 149.3 hours of fishing in Oregon and Washington, respectively, and one jack for every 74.7 hours of fishing in Washington. Total effort was estimated at 522.7 (95% CI = 195-850) and 485.3 (95% CI = 316-655) angler hours in Oregon and Washington, respectively (Table 6). We estimated two (95% CI = 0-4) and five (95% CI = 0-12) N-O adults were caught and released in Oregon and Washington, respectively (Table 6). We estimated 10 (95% CI = 0-28) H-O adults were harvested in Oregon and none in Washington. We estimated that anglers harvested four (95% CI = 0-12) H-O jacks in Washington and none in Oregon (Table 6). Applying a handling mortality rate of 10.0%, we estimated an incidental mortality of one N-O salmon from the Wallowa-Lostine stock during the Grande Ronde fishery. Finally, we estimated that 18 (95% CI = 0-47) bull trout were handled in during the fishery.

The Wallowa River fishery opened on 21 Jun and closed on 27 Jul (37 days). The area open to salmon angling extended from the downstream end of Minam State Park (RM 8) upstream to the confluence with the Lostine River (RM 25). The daily bag limit included two adult adipose fin-clipped Chinook per day and five fin-clipped jacks and anglers were required to cease angling if they had retained a daily limit of marked adults.

Creel surveys were conducted on 22 days of the Wallowa River fishery. During the survey 134 anglers were contacted that fished a total of 377 hours. Anglers reported an average catch of one adult Chinook (N-O and H-O combined) for every 106.4 hours of fishing and one jack for every 100.0 hours of fishing. Total effort was estimated at 1,611 (95% CI = 1,126-2,096) angler hours (Table 6). We estimated two

(95% CI = 0-4) N-O adults were caught and released in the fishery (Table 6). We estimated 10 (95% CI = 0-21) H-O adults were harvested and eight (95% CI = 0-18) H-O jacks (Table 6). Applying a handling mortality rate of 10.0%, we estimated an incidental mortality of zero N-O salmon in the Wallowa fishery. Finally, we estimated that 10 (95% CI = 1-19) bull trout were handled during the fishery.

Based on these creel surveys, the 2014 Grande Ronde and Wallowa fisheries were managed within predetermined ESA impact limits and harvest sharing agreements. Estimates provided from the creel survey indicated that 7.1% (1 of 14) of the allowable N-O impacts were used for the Wallowa-Lostine and zero for the remaining Grande Ronde and Wallowa tributaries. Allowable H-O harvest quotas used in the Grande Ronde and Wallowa fisheries were 1.6% for Lookingglass stock (that remained after the Lookingglass fishery) and 8.0% (18 harvested adults of 224 allowed) for the Wallowa-Lostine stock. Harvest was estimated at zero H-O adults from Catherine Creek and the upper Grande Ronde River.

Imnaha River – In-season return estimates based on PIT tag recoveries at mainstem dams indicated a modest return of adult Chinook to the Imnaha River in 2014. However; a relatively large return of jacks were expected. State and Tribal co-managers agreed to manage fisheries in the Imnaha River based on a total estimated return of 662 N-O adults and 600 H-O adults. In addition, 2,487 H-O jacks were estimated to return to the Imnaha River (Table 5).

Using these run estimates, FMEP guidelines allowed for a sport fishery impact of 11 N-O adults (1.66 % of the run) and an allowable harvest of 100 adult H-O salmon (16.67% of the run). While technically allowable under FMEP guidelines, these margins were considered quite small to successfully manage an open-ended (i.e., no predetermined closure date) fishery in the Imnaha River. Therefore, we chose to open the Imnaha sport fishery for a limited-duration adult harvest followed by an open-ended fishery targeting jack salmon only.

The 2014 Imnaha sport fishery was managed within three constraints: 1) the allowable number of N-O adults handled in the fishery, 2) the combined number of H-O adult harvest (during 5-6 Jul) and incidental mortality in the fishery (during the following jack-only season), and 3) the number of H-O jacks harvested in the fishery. Given the run estimates, FMEP guidance, and an applied handling mortality of 10.0%; sport anglers were limited to handling less than 110 N-O adult salmon. Combined H-O adult harvest and/or incidental mortality could not exceed 100 fish. In addition, we planned to harvest no more than 1,244 H-O jacks (50% of the estimated return) in the Imnaha River during the 2014 fishery.

The sport fishery on the Imnaha River opened 5 Jul and closed 27 Jul (23 days). The area open to anglers extended from the mouth to Summit Creek Bridge (RM 45) on the Imnaha River. The Imnaha River was opened for adult salmon retention 5-6 Jul. During these two days, daily bag limits were two adult adipose fin-clipped Chinook per day and five fin-clipped jacks. Anglers were required to cease angling if they had retained a daily limit of marked adults. From 7-27 Jul the fishery was limited to a daily bag limit of five fin-clipped jacks per day.

Creel surveys were conducted on 14 days of the Imnaha River fishery. During the survey 87 anglers were contacted that fished a total of 297 hours. Anglers reported an average catch of one adult Chinook (N-O and H-O combined) for every 17.4 hours of fishing and one jack for every 11.7 hours of fishing. Total effort was estimated at 1,133 (95% CI = 640-1,627) angler hours for the Imnaha fishery (Table 6). We estimated that four (95% CI = 0-12) H-O adults were caught and released in the Imnaha fishery. We estimated six (95% CI = 2-10) N-O adults were caught and released in the fishery (Table 6). From 5-6 Jul, we estimated 33 (95% CI = 1-65) H-O adults were harvested and zero were reported caught during the jack-only fishery. We estimated that anglers harvested 99 (95% CI = 24-175) H-O jacks, and caught no N-

O jacks (Table 6). Applying a handling mortality rate of 10.0%, we estimated an incidental mortality of one and zero N-O and H-O adult salmon, respectively. Finally, we estimated that no bull trout were handled during the fishery.

Based on these creel surveys, the 2014 Imnaha fishery was managed within predetermined ESA impact limits and harvest sharing agreements. Estimates provided from the creel survey indicated that 9.1% (1 incidental mortality of 11 allowed) of the N-O impacts and 33.0% (33 harvested of 100 allowed) of the H-O harvest quota were used in the fishery. We estimated that anglers harvested 8.0% (99 harvested of 1,244 allowed) of the quota on jack salmon during the fishery.

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Table 1. List of the natural fish populations, “Viable Salmonid Population” thresholds, and associated hatchery stocks in the Imnaha and Grande Ronde River Basins.

Natural Populations (or Management Units)	Critical Threshold	Minimum Abundance Threshold (MAT)	Associated hatchery stock(s)	Hatchery stock essential for recovery?
Imnaha R (inc. Big Sheep Cr)	<u>Abundance</u> : 300 adults/yr <u>Productivity</u> : short term avg. replacement rate <0.7	<u>Abundance</u> :1000 adults/yr <u>Productivity</u> : long term avg. replacement rate =1	Lookingglass Hatchery Imnaha stock	Y
Wallowa/ Lostine R	<u>Abundance</u> : 300 adults/yr <u>Productivity</u> : short term avg. replacement rate <0.7	<u>Abundance</u> :1000 adults/yr <u>Productivity</u> : long term avg. replacement rate =1	Lookingglass Hatchery Lostine stock	Y
Catherine/Indian Cr ¹	<u>Abundance</u> : 300 adults/yr <u>Productivity</u> : short term avg. replacement rate <0.7	<u>Abundance</u> :1000 adults/yr <u>Productivity</u> : long term avg. replacement rate =1	Lookingglass Hatchery Catherine Creek stock	Y
Upper Grande Ronde R	<u>Abundance</u> : 300 adults/yr <u>Productivity</u> : short term avg. replacement rate <0.7	<u>Abundance</u> :1000 adults/yr <u>Productivity</u> : long term avg. replacement rate =1	Lookingglass Hatchery U. Grande Ronde stock	Y
Wenaha R	<u>Abundance</u> : 225 adults/yr <u>Productivity</u> : short term avg. replacement rate <0.7	<u>Abundance</u> : 750 adults/yr <u>Productivity</u> : long term avg. replacement rate =1	None	N/A
Minam R	<u>Abundance</u> : 225 adults/yr <u>Productivity</u> : short term avg. replacement rate <0.7	<u>Abundance</u> : 750 adults/yr <u>Productivity</u> : long term avg. replacement rate =1	None	N/A
Lookingglass Cr	<u>Abundance</u> : 150 adults/yr <u>Productivity</u> : short term avg. replacement rate <0.7	<u>Abundance</u> : 500 adults/yr <u>Productivity</u> : long term avg. replacement rate =1	Lookingglass Hatchery Catherine Creek stock	N

¹When fisheries target only the Catherine Creek portion of the Catherine/Indian Population, then the fisheries will be managed based on a Critical Threshold of 225 with a MAT of 750 as for an Intermediate-sized population.

Table 2. Total collective natural-origin adult harvest/impact rates relative to critical and minimum abundance threshold (MAT) levels described in Table 1.

Fishery Scenario	Expected return of natural-origin fish	Total collective natural-origin mortality
A	Below Critical Threshold	1%*
B	Critical to MAT	A + 11% of margin above A*
C	MAT to 1.5X MAT	B + 22% of margin above B
D	1.5X MAT to 2X MAT	C + 25% of margin above C
E	Greater than 2X MAT	D + 40% of margin above D

* For Lookingglass Creek fisheries will be managed more liberally under fishery scenarios A & B: A = 10% total harvest (tribal 8% and sport 2%); B = A + 16% of margin above critical (tribal 12% and sport 4%).

Table 3. Natural-origin adult harvest/impact rates based on existing co-manager agreements, including collective natural-origin mortality rates as described in Table 2.

Fishery Scenario	Number of Natural Origin Fish	Annual natural-origin mortality based on co-manager agreements		Total Collective Natural-Origin Mortality (All Fisheries)
		Tribal	State	
A	Below Critical Threshold	1%*	0%*	1%*
B	Critical To MAT	A + 8% of margin above critical*	A + 3% of margin above critical*	A + 11% of margin above critical*
C	MAT To 1.5X MAT	B + 16% of margin above MAT	B + 6% of margin above MAT	B + 22% of margin above MAT
D	1.5X MAT To 2X MAT	C + 19% of margin above 1.5X MAT	C + 6% of margin above MAT	C + 25% of margin above MAT
E	Greater than 2X MAT	D + 28% of margin above 2X MAT	D + 12% of margin above 2X MAT	D + 40% of margin above 2X MAT

* For Lookingglass Creek fisheries will be managed more liberally under fishery scenarios A & B: A = 10% total harvest (tribal 8% and sport 2%); B = A + 16% of margin above critical (tribal 12% and sport 4%).

Table 4. Proportion of estimated catch in the Grande Ronde fishery by stock during the 27 Jun to 30 Jul fishery and allocated catch estimates by creel section. No fish were estimated caught during the 5-7 Jul fishery.

Section 1	Proportion of Estimated Catch		Allocated Catch Estimates	
	Wild Adults Released	Hatchery Adults Harvested	Wild Adults ^a Released	Hatchery Adults Harvested
Upper Grande Ronde	0.00	0.00	0	0
Catherine Creek	0.02	0.00	0	0
Lookingglass Creek	0.03	0.07	0	0
Wallowa-Lostine	0.24	0.93	1	0
Minam	0.05		0	
Wenaha	0.66		1	
Washington Total			2	0

Section 2	Proportion of Estimated Catch		Allocated Catch Estimates	
	Wild Adults Released	Hatchery Adults Harvested	Wild Adults Released	Hatchery Adults Harvested
Upper Grande Ronde	0.00	0.00	0	0
Catherine Creek	0.02	0.00	0	0
Lookingglass Creek	0.03	0.07	0	1
Wallowa-Lostine	0.24	0.93	0	8
Minam	0.05		0	
Wenaha	0.66		0	

Section 3	Proportion of Estimated Catch		Allocated Catch Estimates	
	Wild Adults Released	Hatchery Adults Harvested	Wild Adults Released	Hatchery Adults Harvested
Upper Grande Ronde	0.00	0.00	0	0
Catherine Creek	0.07	0.00	0	0
Lookingglass Creek	0.09	0.07	0	0
Wallowa-Lostine	0.71	0.93	4	1
Minam	0.14		1	
Wenaha ^b				
Oregon Total			5	10

^a Allocated catch estimates are rounded to match the estimated catch for section 1.

^b Creel section three on the Grande Ronde River was above the Wenaha River. Therefore, Wenaha N-O adults were not considered part of the catch proportion for this section.

Table 5. Return estimates of spring Chinook salmon to the Imnaha and Grande Ronde Basins in 2014.

Population	Projected Run Size		
	Adult (age 4 & 5)		Jack (age 3) ^a
	Natural	Hatchery	Hatchery
<i>Imnaha Basin</i>			
Imnaha River ^c	662	600	2,487
<i>Grande Ronde Basin</i>			
Catherine Creek ^b	524	412	–
Lookingglass Creek	375	1,173	–
Upper Grande Ronde River ^b	242	349	–
Wallowa-Lostine River ^{c,d}	770	1,230	–
Minam River ^{b,f}	413	–	–
Wenaha River ^{b, f}	780	–	–

^a Natural and/or hatchery jack estimates are not utilized for fishery management decisions, but are only used to structure additional harvest opportunity. We show hatchery jack estimates only for populations that offered a period of jack only fisheries in 2014.

^b Estimates based on pre-season run projections. Fisheries were not implemented on these populations; therefore in-season updates were not conducted.

^c Estimates based on in-season projections utilizing PIT tag detections at mainstem dams in mid-Jun 2014

^d Natural-origin returns a function of projected returns to the Lostine River plus added natural production to the Wallowa Basin. Redd counts suggest that total returns to the Wallowa-Lostine population are 1.5X estimated returns to the Lostine River.

^f Managed for natural production only, no hatchery returns are projected (outside of strays) for the basins.

Table 6. Estimates of effort, catch, and harvest during the 2014 Lookingglass Creek (31 May to 18 Jun) Wallowa (21 Jun to 27 Jul), Grande Ronde (27-30 Jun and 5-7 Jul), and Imnaha rivers (5-23 Jul) fisheries. Ninety-five percent (95%) confidence limits are indicated in parentheses. The Imnaha River fishery allowed for marked adult retention from 5-6 Jul, only marked jack retention was allowed 7-27 Jul.

Fishery Parameter	Lookingglass Creek (95% CI)	Imnaha River (95% CI)	Wallowa River (95% CI)	Grande Ronde River (95% CI)
Fishery Days	19	21	37	7
Total Estimated Angler Hours	3,416 (3120-3708)	1,133 (640-1627)	1,611 (1126-2096)	1,008 (640-1367)
Marked Adults Harvested	197 (121-273)	33 (1-65)	10 (0-21)	10 (0-18)
Marked Jacks Harvested	75 (63-87)	99 (24-175)	8 (0-18)	4 (0-12)
Unmarked Adults Released	53 (26-80)	6 (2-10)	2 (0-4)	7 (0-15)
Unmarked Jacks Released	12 (0-26)	–	28 (17-39)	–
Marked Adults Released	5 (0-15)	4 (0-12)	–	–
Bull Trout Released	34 (13-55)	–	10 (1-19)	18 (0-47)

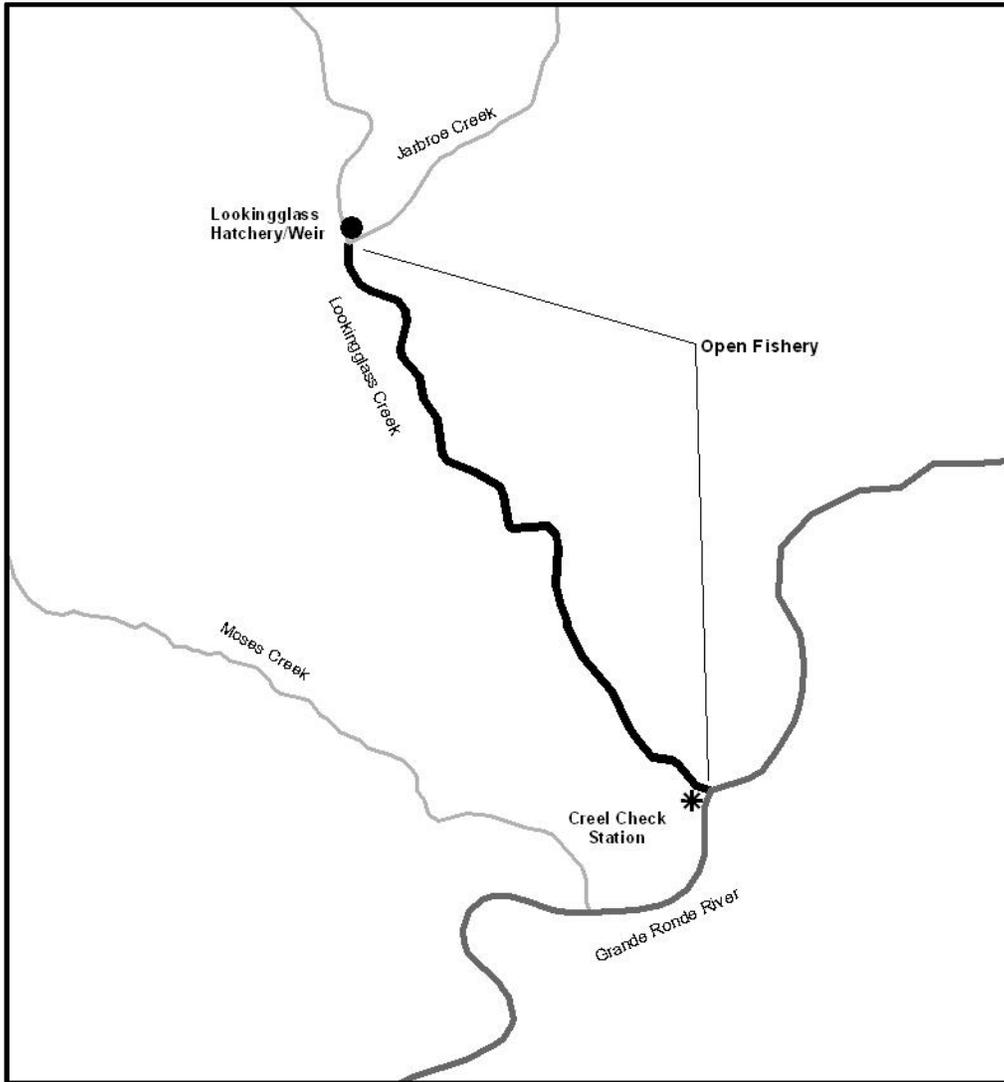


Figure 1. The Lookingglass Creek fishery management area (RM 0 to 2) showing area open to fishing and the location of the access point survey (creel check station) near the confluence with the Grande Ronde River at Palmer Junction, OR.

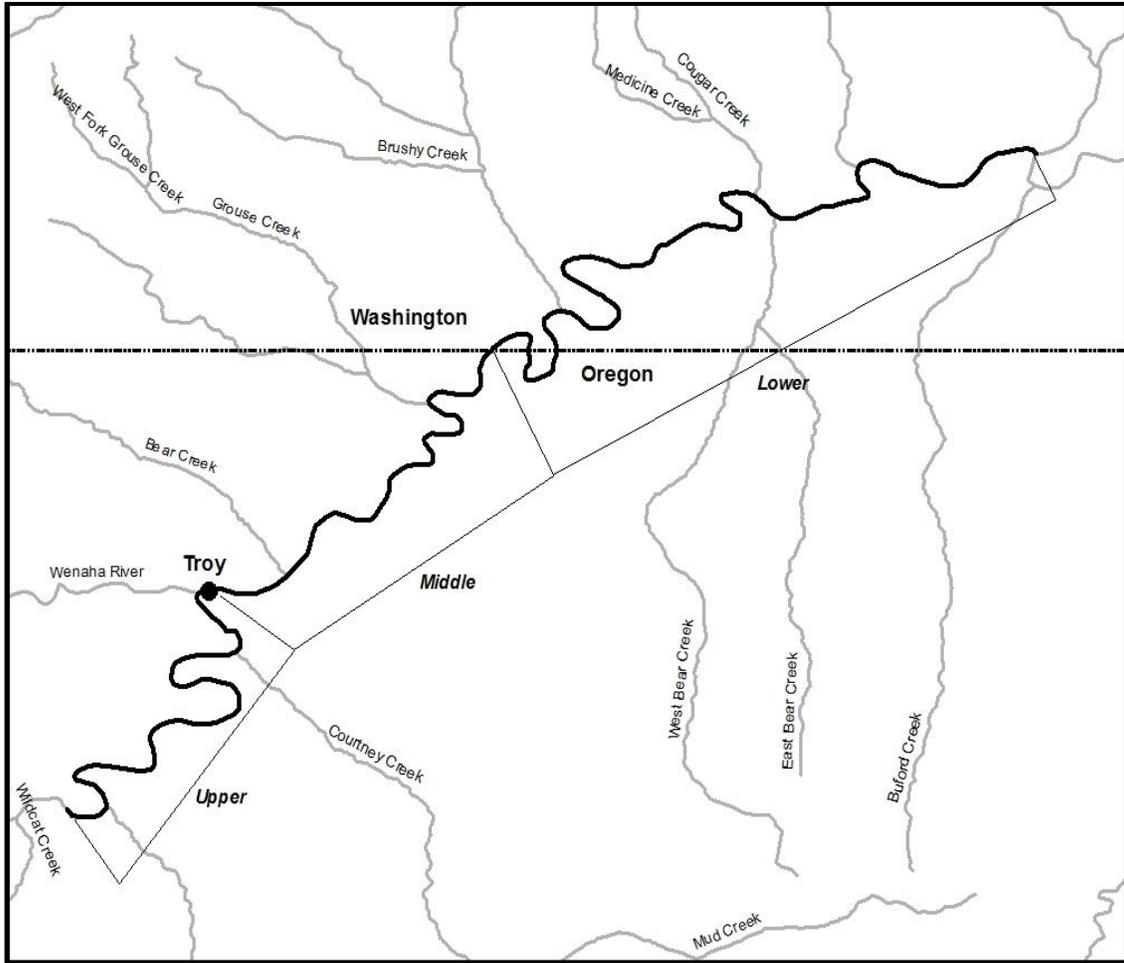


Figure 2. The Grande Ronde River fishery management area (RM 26 to 52) showing area open to fishing and creel survey sections near Troy, OR

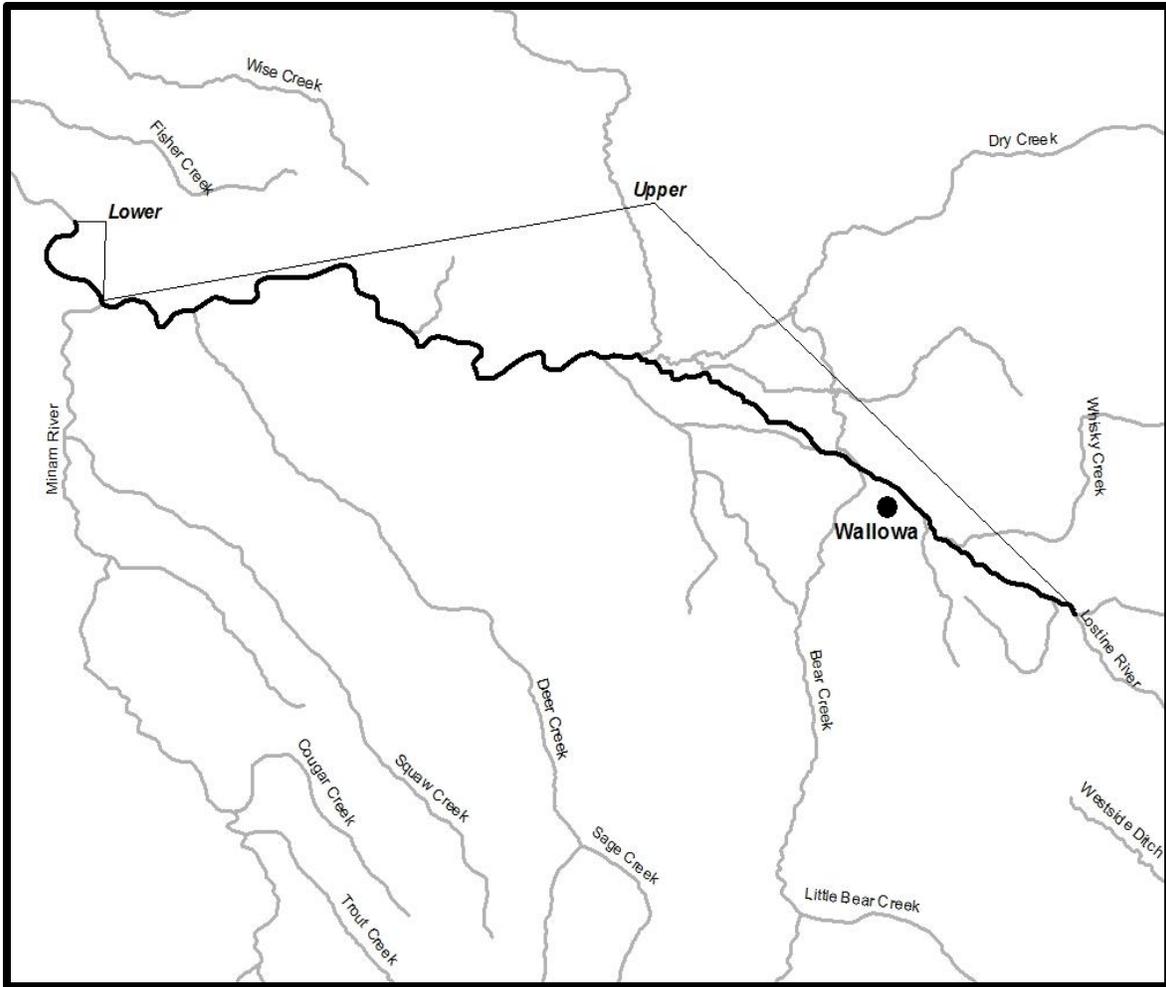


Figure 3. The Wallowa River fishery management area (RM 8 to 25) showing area open to fishing and creel survey reaches near Wallowa, OR.

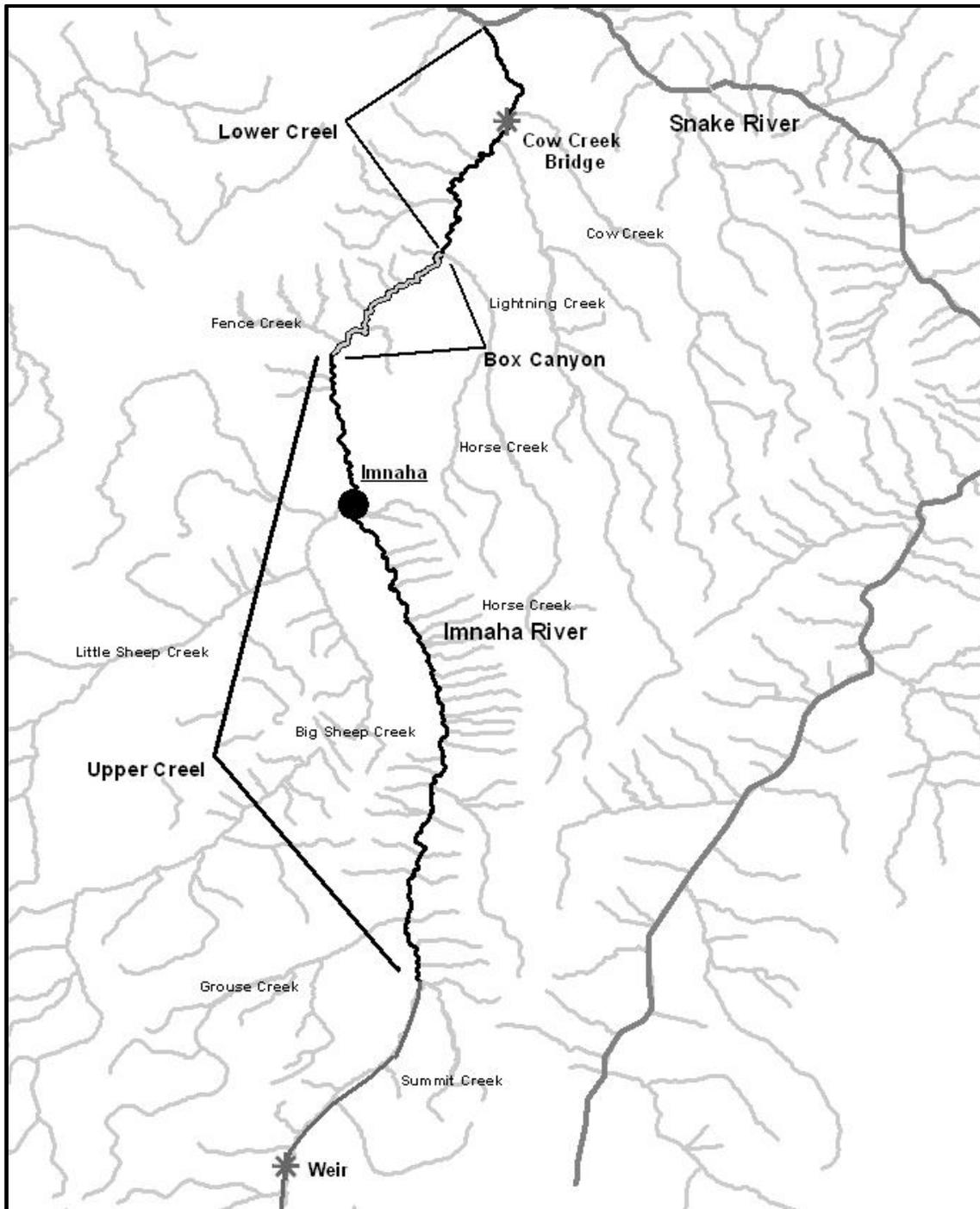


Figure 4. The Imnaha River fishery management area (RM 0 to 48) showing descriptions of surveyed reaches (lower RM 5-13, upper RM 20-48), the unsurveyed Box Canyon reach (RM 13-20), major tributaries, and the location of the adult weir and juvenile release facility upstream of the fishery area.

APPENDIX TABLES

Appendix Table 1. Lookingglass Creek spring Chinook sport fisheries adult (age-4 and 5 only) impact for years 2011 through 2014. The 2013 fishery was limited to retention of jacks only.

Year	Sport Season	Harvest	Released		Impact ²
		(H) ¹	(H)	(N) ¹	(N)
2011	5/28-7/15	141	4	38	3
2012	5/26-6/12 6/22-6/25	464	20	26	4
2013	6/1-6/21	0	40	16	1
2014	5/31-6/18	197	5	53	4

¹ (H) = Hatchery-origin fish, (N) = Natural-origin fish

² Impact includes 10% fishery mortality for both hatchery and wild fish caught and released

Appendix Table 2. Wallowa River spring Chinook sport fisheries adult (age-4 and 5 only) impact for years 2008 through 2014. Adult abundance did not support sport harvest in 2013.

Year	Sport Season	Est. Harvest	Est. Released		Impact ²
		(H) ¹	(H)	(N) ¹	(N)
2008	6/4-6/13	0	0	0	0
2009	6/13-7/12	10	0	11	1
2010	5/22-7/25	45	0	47	5
2011	5/28-8/7	25	0	28	3
2012	6/9-7/15	0	0	15	2
2014	6/21-7/27	10	0	2	0

¹ (H) = Hatchery-origin fish, (N) = Natural-origin fish

² Impact includes 10% fishery mortality for both hatchery and wild fish caught and released

Appendix Table 3. Imnaha River spring Chinook sport fisheries adult (age-4 and 5 only) impact for years 2001 through 2014. Adult abundance did not support sport harvest in 2006 and 2007.

Year	Sport Season	Est. Harvest	Est. Released		Impact ³
		(H) ¹	(H)	(N) ¹	(N)
2001	6/2-6/21	302	21	433	43
2002	6/1-6/30	152	9	15	2
2003	6/7-7/1	125	22	83	8
2004	6/19-7/5	192	21	29	3
2005	6/25-7/4	22	54	22	2
2008	7/4-7/15	64	0	17	2
2009	6/13-7/12	197	0	50	5
2010	5/22-7/25	336	48	108	11
2011	5/28-7/23	519	0	153	15
2012	6/9-6/27	203	0	62	6
2013	7/5-7/19	30	0	11	1
2014	7/5-7/27	33	4	6	1

¹ (H) = Hatchery-origin fish, (N) = Natural-origin fish

² Impact includes 10% fishery mortality for both hatchery and wild fish caught and released

